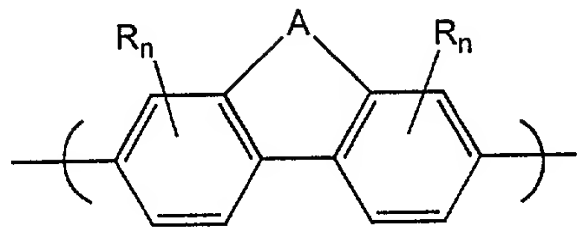
WHAT IS CLAIMED IS:

1. A composition comprising a polymer comprising repeat units selected from the group consisting of:



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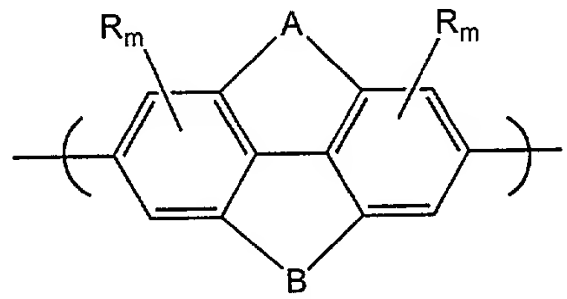

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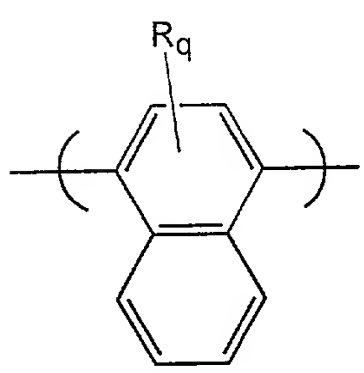

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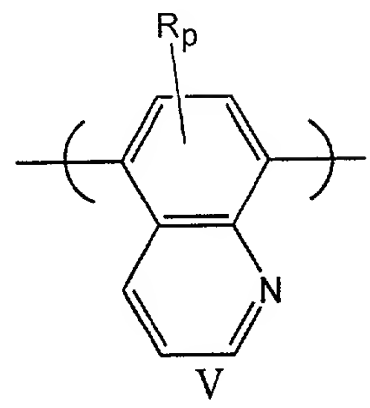

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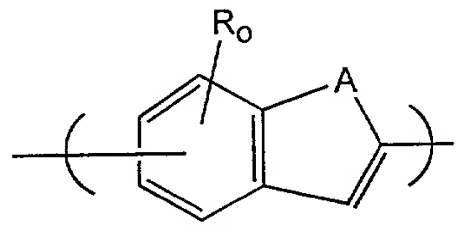

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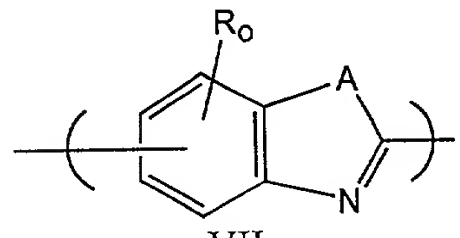

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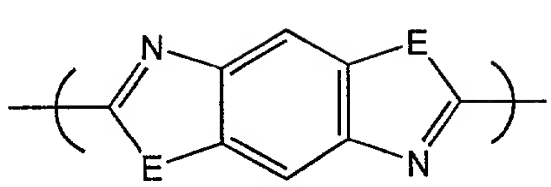

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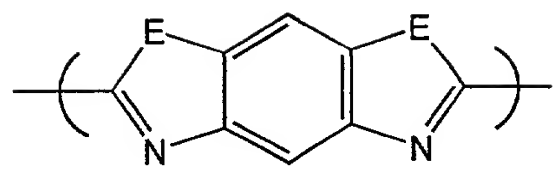

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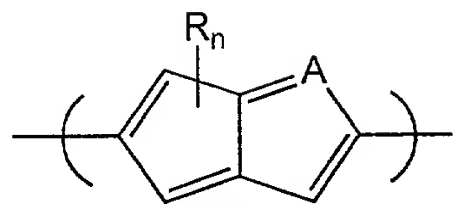

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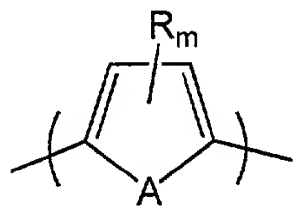

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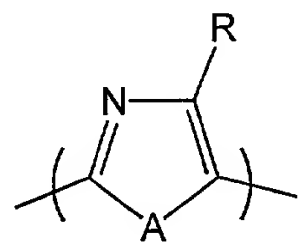


XII

where R is independently selected from H, D, F, alkoxy, aryloxy, alkyl, aryl, alkyl ketone, aryl ketone, alkylester, arylester, amide, carboxylic acid, fluoroalkyl, fluoroaryl, polyalkalene oxy, any two of the R groups may be bridging, m is 0-2, n is 0-3, o is 0-4, p is 0-5, and q is 0-6, A and B are independently selected from the group consisting of -O-, -S-, -NR_1-, and -CR_1R_2-, -$CR_1R_2CR_3R_4$- , -N=CR_1-, -CR_1=CR_2-, -N=N-, and -(CO)- where R_1-R_4 are H, D, F, alkyl, aryl, alkyleneoxy, polyalkyleneoxy, alkoxy, aryloxy, fluoroalkyl, and fluoroaryl, two of the R groups may be bridging, m is 0-2, n is 0-3, o is 0-4, p is 0-5, q is 0-6, and r is 0-7, and E is selected from the group consisting of O, NH, and S; and

one or more luminescent metal ions or luminescent metal ion complexes.

2. The composition of claim 1, wherein the luminescent metal ion or luminescent metal ion complex comprises a lanthanide metal ion.

3. The composition of claim 1, wherein the polymer is a copolymer.

4. The composition of claim 1, wherein the polymer is a dendritic or hyperbranched polymer.

5. The composition of claim 1, wherein said polymer comprises repeat units of structure II.

6. The composition of claim 1, wherein the luminescent metal ion or luminescent metal ion complex comprises cerium.

7. The composition of claim 1, wherein the luminescent metal ion or luminescent metal ion complex comprises europium.

8. The composition of claim 1, wherein the luminescent metal ion or luminescent metal ion complex comprises terbium.

9. The composition of claim 1, wherein the polymer is a copolymer.

10. The composition of claim 9, wherein one of the repeat units has structure II.

11. The composition of claim 10, wherein for one of the repeat units having structure II q is 0, A is $-CR_1R_2-$, and R_1 and R_2 are alkyl.

12. The composition of claim 11, wherein a second repeat unit has structure II, wherein q is 0, A is $-CR_1R_2-$, and R_1 and R_2 are independently selected from the group consisting of H, D, F, alkyl, aryl, alkyleneoxy, polyalkyleneoxy, alkoxy, aryloxy, fluoroalkyl, and fluoroaryl.

13. The composition of claim 1, wherein the luminescent metal ion or luminescent metal ion complex is present as part of an inorganic solid.

14. The composition of claim 13, wherein the inorganic solid is a nanosized powder with physical dimensions in the 1 to 1000 nanometer range.

15. The composition of claim 14, wherein the inorganic solid is a semiconductor.

16. The composition of claim 15, wherein the semiconductor is a II-VI semiconductor.

17. The composition of claim 1, wherein the luminescent metal ion or luminescent metal ion complex comprises a metal ion selected from the group consisting of chromium, manganese, iron, cobalt, molybdenum, ruthenium, rhodium, palladium, silver, tungsten, rhenium, osmium, iridium, platinum, gold, and uranium.

18. An electroluminescent device comprising the composition of claim 1.

19. The composition of claim 13, wherein the inorganic solid is a semiconductor.

20. The composition of claim 19, wherein the semiconductor is a II-VI semiconductor.

21. The composition of claim 1 having emission bands of 20 nm or less.

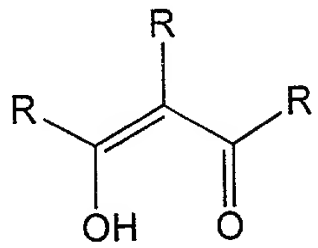
22. The composition of claim 1 having emission bands of 10 nm or less.

23. The composition of claim 1 having emission bands of 5 nm or less.

24. The composition of claim 1 having emission bands of 3 nm or less.

25. The composition of claim 1, wherein the luminescent metal ion or luminescent metal ion complex comprises a polarizable ligand.

26. The composition of claim 25, wherein the polarizable ligand is selected from the group consisting of :



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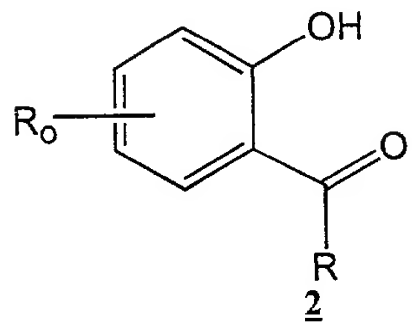

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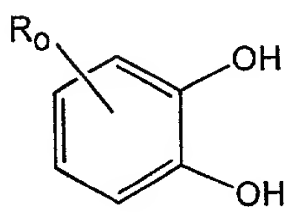

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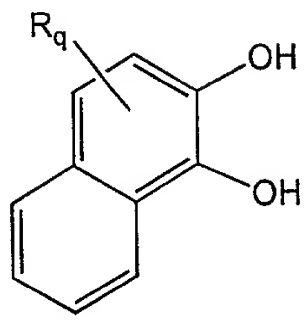

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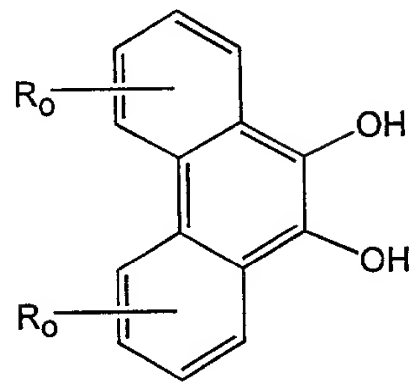

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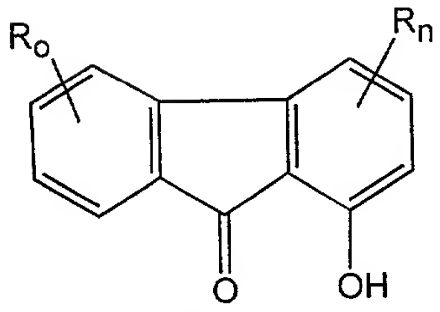

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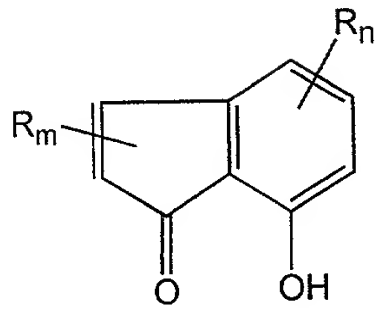

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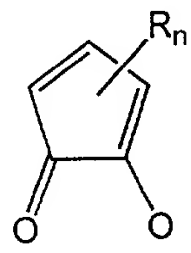

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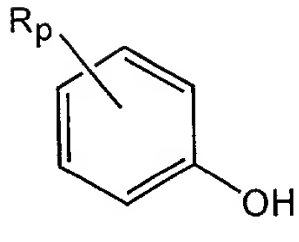

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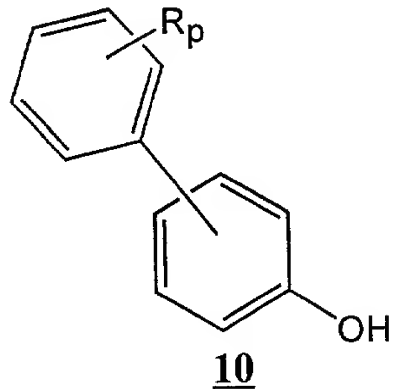

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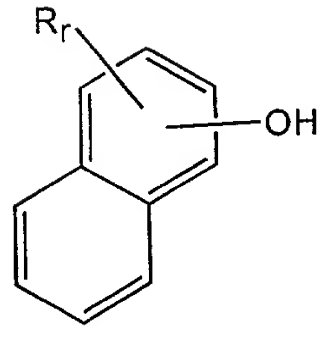

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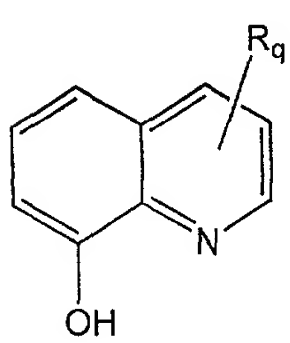

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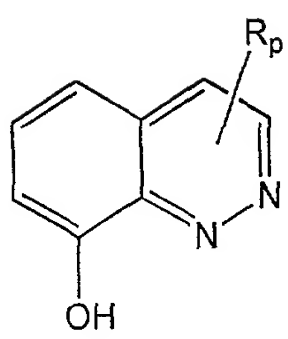

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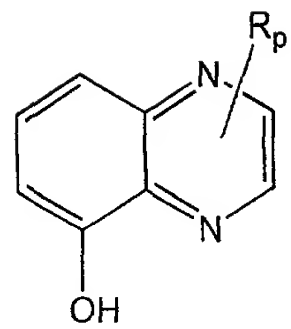

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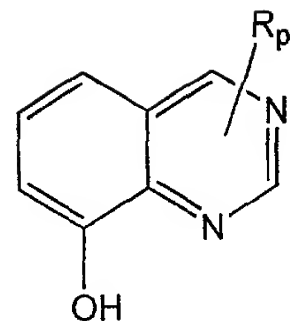

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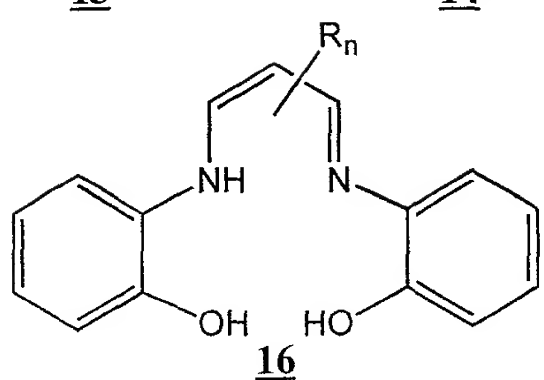

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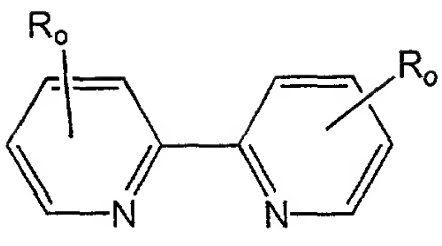

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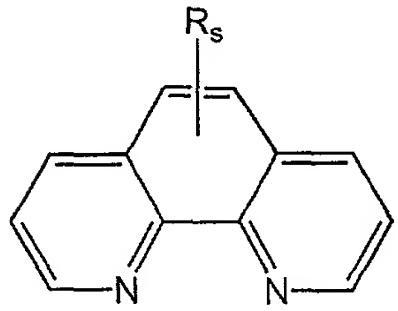

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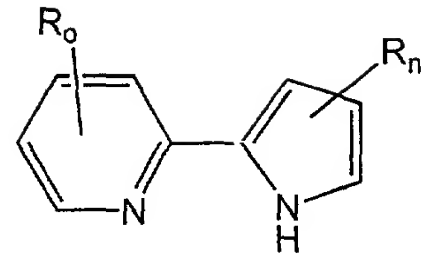


19

27. The composition of claim 25, wherein the polarizable ligand is part of a polymer chain.

28. The composition of claim 27, wherein the polymer chain is a conjugated polymer chain.

29. The composition of claim 1, wherein the polymer is a crosslinked polymer.

30. The composition of claim 1, wherein the polymer is an oligomer.

31. The composition of claim 1, wherein the polymer is a branched polymer.

32. The composition of claim 1, wherein the polymer is a block co-polymer.

33. The composition of claim 1, wherein the polymer is a random co-polymer.

34. The composition of claim 1, wherein the polymer is a graft co-polymer.

35. The composition of claim 1, wherein the conjugation length of the polymer is controlled with non-aromatic spacer groups.

36. The composition of claim 35, wherein the spacer groups are selected from the group consisting of -O-, -S-, -NR-, $-CR_1R_2-$, $(CH_2)_n-$, $-(CF_2)_n-$, ester, and amide.

37. The composition of claim 35, wherein the conjugation length is between 2 and 50 conjugated rings.

38. The composition of claim 35, wherein the conjugation length is between 3 and 10 conjugated rings.

39. The composition of claim 36, wherein the conjugation length is between 3 and 6 conjugated rings.

40. An electroluminescent device comprising the composition of claim 1.

41. The electroluminescent device of claim 40, wherein the polymer is a crosslinked polymer.

42. An electroluminescent device comprising:
a first electrode;
one or more charge transport materials; and

an electroluminescent layer comprising the composition of claim 1 and a second electrode.

43. The electroluminescent device of claim 42, wherein one or both of said electrodes is a transparent electrode.

44. The electroluminescent device of claim 42, wherein one or both of said electrodes comprises tin oxide or doped tin oxide.

45. The electroluminescent device of claim 42, wherein one of the charge transport materials is a hole transport material provided as a distinct layer.

46. The electroluminescent device of claim 42 comprising two layers; a first layer comprising a hole transport material, and the electroluminescent layer which comprises an electron transport material.

47. The electroluminescent device of claim 42, wherein an electron transport material is provided as a distinct layer.

48. The electroluminescent device of claim 42 comprising two layers; a first layer comprising an electron transport material, and the electroluminescent layer which comprises a hole transport material.

49. The electroluminescent device of claim 42 comprising three layers, the electroluminescent layer sandwiched between a layer of electron transport material and a layer hole transport material.

50. The electroluminescent device of claim 49, wherein the layers are not distinct, but graded.

51. The electroluminescent device of claim 42 comprising a hole transport material and an electron transport material both of which are graded in the electroluminescent layer.

52. The electroluminescent device of claim 42, wherein the emission bands are 20 nm or less.

53. The electroluminescent device of claim 42, wherein the emission bands are 10 nm or less.

54. The electroluminescent device of claim 42, wherein the emission bands are 5 nm or less.

55. The electroluminescent device of claim 42, wherein the emission bands are 3 nm or less.

56. The electroluminescent device of claim 42, wherein the electroluminescent layer comprises a nanosized powder with physical dimensions in the 1 to 1000 nanometer range.

57. The electroluminescent device of claim 42, wherein the turn-on voltage is less than 15V.

58. The electroluminescent device of claim 42, wherein the turn-on voltage is less than 10V.

59. The electroluminescent device of claim 42, wherein the turn-on voltage is less than 5V.

60. An electroluminescent composition comprising:
an aromatic hydrocarbon matrix; and
a lanthanide metal complex having an aromatic ligand.

61. The composition of claim 60, wherein said aromatic ligand has a diaryl group.

62. The composition of claim 60, wherein said aromatic ligand has a two ring fused ring group.

63. The composition of claim 60, wherein said aromatic ligand has a triaryl group.

64. The composition of claim 60, wherein said aromatic ligand has a three ring fused ring group.

65. The composition of claim 60, wherein said aromatic ligand has a polyaryl group.

66. An electroluminescent device comprising the composition of claim 60.

67. An electroluminescent device comprising:
a first electrode;
one or more charge transport layers; and
an electroluminescent layer comprising the compoition of claim 60 and a second electrode.

68. The electroluminescent device of claim 67, wherein one or both of said electrodes is a transparent electrode.

69. The electroluminescent device of claim 67, wherein one or both of said electrodes comprises tin oxide or doped tin oxide.

70. The electroluminescent device of claim 67, wherein one of the layers is a hole transport layer.

71. The electroluminescent device of claim 67, wherein one of the layers is a hole transport layer and another of the layers is a mixed layer comprising a luminescent material and an electron transport material.

72. The electroluminescent device of claim 67, wherein one of the layers is an electron transport layer.

73. The electroluminescent device of claim 67, wherein one of the layers is an electron transport layer and another of the layers is a mixed layer comprising a luminescent material and a hole transport material.

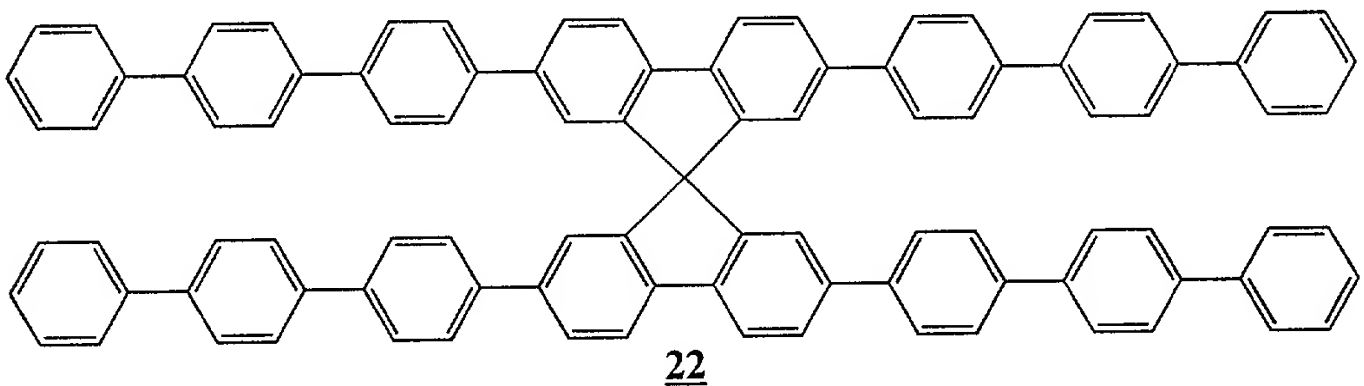
74. The electroluminescent device of claim 67, wherein one of the layers is a hole transport layer, another of the layers is a luminescent layer, and another of the layers is an electron transport layer.

75. The electroluminescent device of claim 73, wherein the mixed layer is graded.

76. A composition comprising a polarizable matrix comprising discrete molecules and a luminescent lanthanide metal ion.

77. The composition of claim 76, wherein the polarizable matrix is a long arm spiro compound.

78. The composition of claim 76, wherein the polarizable matrix is:



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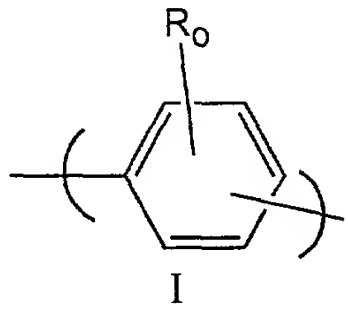
79. A composition comprising a polymer comprising the repeat unit:



I

where R is independently selected from H, D, F, Cl, Br, I alkoxy, aryloxy, alkyl, aryl, alkyl ketone, aryl ketone, alkylester, arylester, amide, carboxylic acid, fluoroalkyl, fluoroaryl, polyalkalene oxy, any two of the R groups may be bridging, m is 0-2, n is 0-3, o is 0-4, p is 0-5, and q is 0-6, A and B are independently selected from the group consisting of -O-, -S-, $-NR_1-$, and $-CR_1R_2-$, $-CR_1R_2CR_3R_4-$, $-N=CR_1-$, $-CR_1=CR_2-$, -N=N-, and -(CO)- where R_1-R_4 are H, D, F, alkyl, aryl, alkyleneoxy, polyalkyleneoxy, alkoxy, aryloxy, fluoroalkyl, and fluoroaryl, two of the R groups may be bridging, m is 0-2, n is 0-3, o is 0-4, p is 0-5, q is 0-6, and r is 0-7, and E is selected from the group consisting of O, NH, and S, and one or more luminescent metal ions or luminescent metal ion complexes, wherein said polymer has a molecular weight of greater than about 30,000 Daltons.

80. The composition of claim 79, wherein said polymer has a molecular weight greater than about 50,000 Daltons.

81. The composition of claim 79, wherein said polymer has a molecular weight greater than about 60,000 Daltons.

82. The composition of claim 79, wherein said polymer has a molecular weight greater than about 100,000 Daltons.

83. The composition of claim 79, wherein said polymer has a molecular weight greater than about 150,000 Daltons.

84. The composition of claim 79, wherein said polymer has a molecular weight greater than about 200,000 Daltons.

85. The composition of claim79, wherein said polymer has an inherent viscosity of at least 1.8 dL/g.

86. The composition of claim 79, wherein said polymer has an inherent viscosity of at least 4.2 dL/g.

87. The composition of claim 79, wherein o is 1, and R is selected from the group consisting of -(C=O)NR_1R_2, -benzoyl, -NR_1R_2, -OR_1, -CHR_1R_2, -phenyl, -naphthyl, and -2-benzoxazole, and R_1 and R_2 are as defined above.

88. The composition of claim 79, wherein the luminescent metal ion or luminescent metal in complex comprises a lanthanide metal ion.

89. The composition of claim 79, wherein the polymer is a copolymer.

90. The composition of claim 79, wherein the polymer is a dendritic or hyperbranched polymer.

91. The composition of claim 79, wherein the luminescent metal ion or luminescent metal ion complex comprises cerium.

92. The composition of claim 79, wherein the luminescent metal ion or luminescent metal ion complex comprises europium.

93. The composition of claim 79, wherein the luminescent metal ion or luminescent metal ion complex comprises terbium.

94. The composition of claim 79, wherein the luminescent metal ion or luminescent metal ion complex is present as part of an inorganic solid.

95. The composition of claim 94, wherein the inorganic solid is a nanosized powder with physical dimensions in the 1 to 1000 nanometer range.

96. The composition of claim 94, wherein the inorganic solid is a semiconductor.

97. The composition of claim 96, wherein the semiconductor is a II-VI semiconductor.

98. The composition of claim 79, wherein the luminescent metal ion or luminescent metal ion complex comprises a metal ion selected from the group consisting of chromium, manganese, iron, cobalt, molybdenum, ruthenium, rhodium, palladium, silver, tungsten, rhenium, osmium, iridium, platinum, gold, and uranium.

99. An electroluminescent device comprising the composition of claim 79.

100. The composition of claim 95, wherein the inorganic solid is a semiconductor.

101. The composition of claim 95, wherein the semiconductor is a II-VI semiconductor.

102. The composition of claim 101 having emission bands of 20 nm or less.

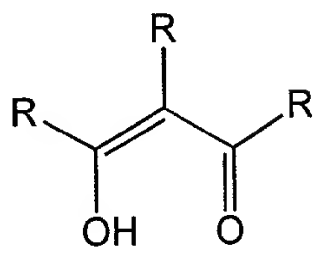
103. The composition of claim 101 having emission bands of 10 nm or less.

104. The composition of claim 79 having emission bands of 5 nm or less.

105. The composition of claim 79 having emission bands of 3 nm or less.

106. The composition of claim 79, wherein the luminescent metal ion or luminescent metal ion complex comprises a polarizable ligand.

107. The composition of claim 106, wherein the polarizable ligand is selected from the group consisting of :



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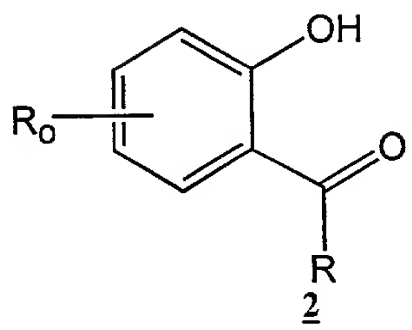

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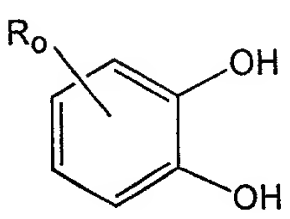

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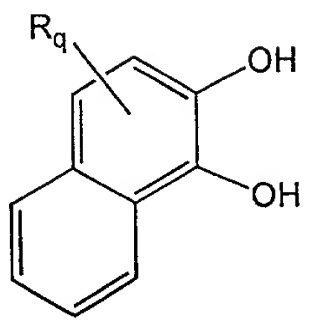

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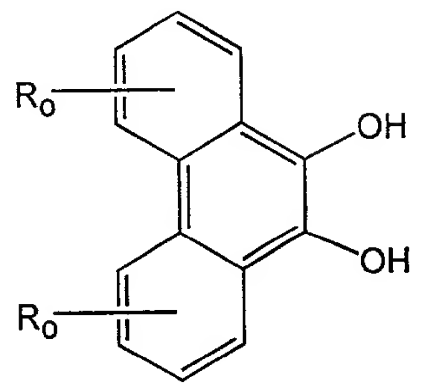

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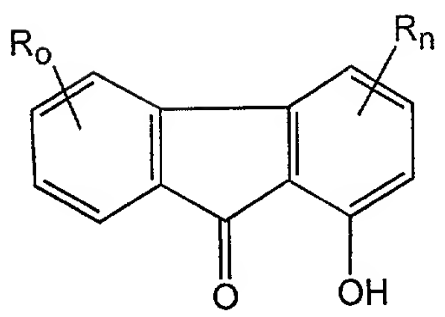

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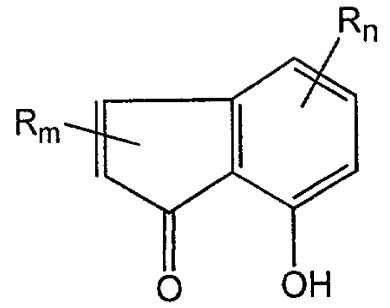

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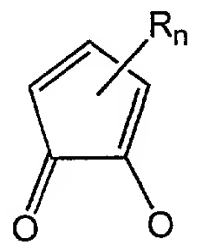

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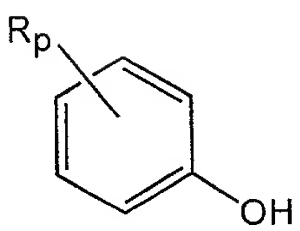

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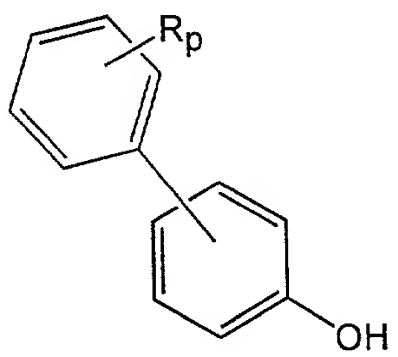

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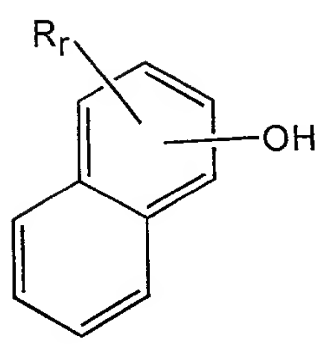

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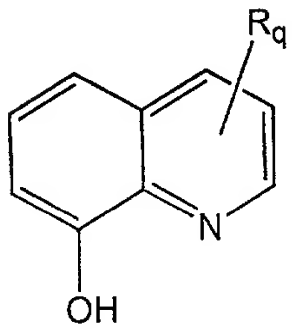

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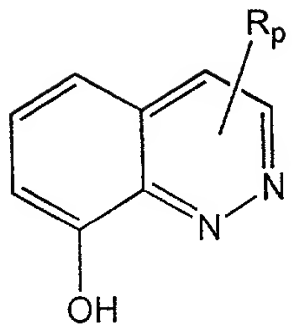

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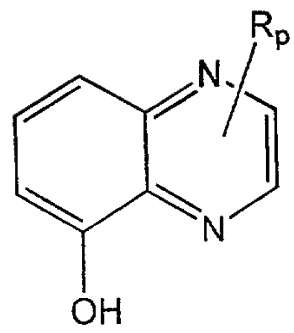

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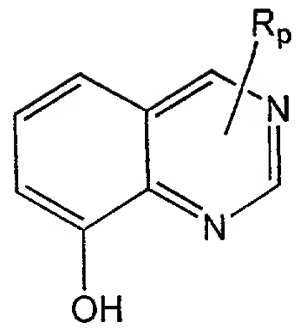

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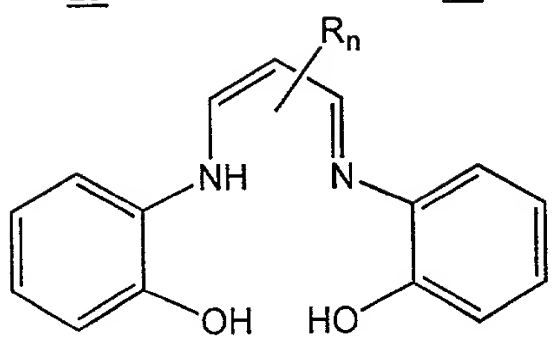

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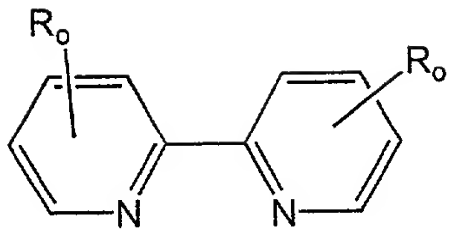

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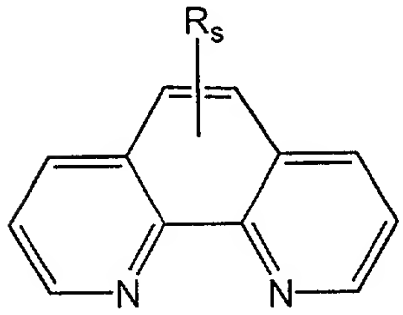

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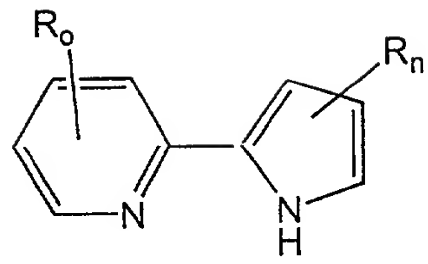


19

108 The composition of claim 106, wherein the polarizable ligand is part of a polymer chain.

109. The composition of claim 118, wherein the polymer chain is a conjugated polymer chain.

110. The composition of claim 79, wherein the polymer is a crosslinked polymer.

111. The composition of claim 79, wherein the polymer is an oligomer.

112. The composition of claim 79, wherein the polymer is a branched polymer.

113 The composition of claim 79, wherein the polymer is a block co-polymer.

114. The composition of claim 79, wherein the polymer is a random co-polymer.

115. The composition of claim 79, wherein the polymer is a graft co-polymer.

116. The composition of claim 79, wherein the conjugation length of the polymer is controlled with non-aromatic spacer groups.

117. The composition of claim 116, wherein the spacer groups are selected from the group consisting of -O-, -S-, -NR-, $-CR_1R_2-$, $(CH_2)_n-$, $-(CF_2)_n-$, ester, and amide.

118. The composition of claim 116, wherein the conjugation length is between 2 and 50 conjugated rings.

119. The composition of claim 116, wherein the conjugation length is between 3 and 10 conjugated rings.

120. The composition of claim 116, wherein the conjugation length is between 3 and 6 conjugated rings.

121. An electroluminescent device comprising:

a first electrode;

one or more charge transport layers; and

an electroluminescent layer comprising the composition of claim 79 and a second electrode.

122. The electroluminescent device of claim 121, wherein one or both of said electrodes is a transparent electrode.

123. The device of claim 121, wherein one or both of said electrodes comprises tin oxide or doped tin oxide.

124. The device of claim 121, wherein one of the charge transport material is a hole transport material provided as a distinct layer.

125. The device of claim 121 comprising two layers; a first layer comprising a hole transport material and the electroluminescent layer.

126. The device of claim 121, wherein an electron transport material is provided as a layer.

127. The device of claim 121 comprising two layers; a first layer comprising an electron transport material and the electroluminescent layer additionally comprising a hole transport material.

128. The device of claim 121 comprising three layers; the electroluminescent layer sandwiched between a layer of electron transport material and a layer hole transport material.

129. The device of claim 128, wherein the layers are not distinct, but are graded.

130. The electroluminescent device of claim 121 comprising a hole transport material and an electron transport material both of which are graded in the electroluminescent layer.

131. The electroluminescent device of claim 121, wherein the emission bands are 20 nm or less.

132. The electroluminescent device of claim 121, wherein the emission bands are 10 nm or less.

133. The electroluminescent device of claim 121, wherein the emission bands are 5 nm or less.

134. The electroluminescent device of claim 121, wherein the emission bands are 3 nm or less.

135. The electroluminescent device of claim 121, wherein the electroluminescent layer comprises a nanosized powder with physical dimensions in the 1 to 1000 nanometer range.

136. The electroluminescent device of claim 121, wherein the turn-on voltage is less than 15V.

137. The electroluminescent device of claim 121, wherein the turn-on voltage is less than 10V.

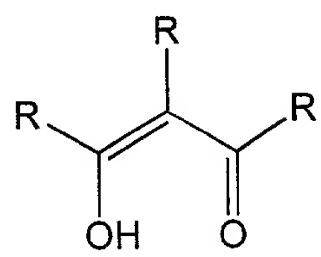
138. The electroluminescent device of claim 121, wherein the turn-on voltage is less than 5V.

139. A composition comprising a polymer of the structure:

—(R—polarizable ligand —R)—(Y)—; and one or more luminescent metal ions or metal ion complexes, wherein R is independently selected from H, D, F, Cl, Br, I, alkoxy, aryloxy, alkyl, aryl, alkyl ketone, aryl ketone, alkylester, arylester, amide, carboxylic acid, fluoroalkyl, fluoroaryl, polyalkalene oxy, any two of the R groups may be bridging, and Y is a polymer repeat unit.

140. The composition of claim 139, wherein the luminescent metal ion or luminescent metal ion complex comprises a metal ion selected from the group consisting of chromium, manganese, iron, cobalt, molybdenum, ruthenium, rhodium, palladium, silver, tungsten, rhenium, osmium, iridium, platinum, gold and uranium.

141. The composition of claim 139, wherein the polarizable ligand is selected for the group consisting of :



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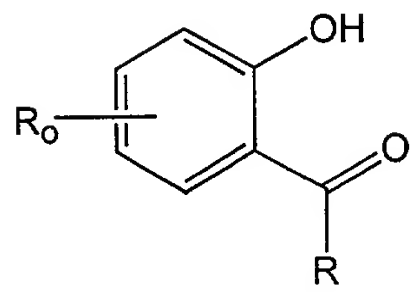

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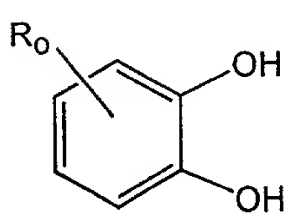

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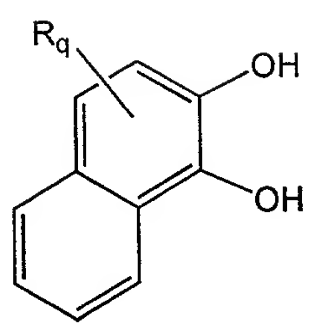

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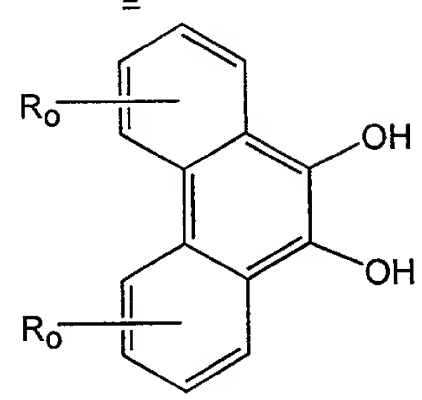

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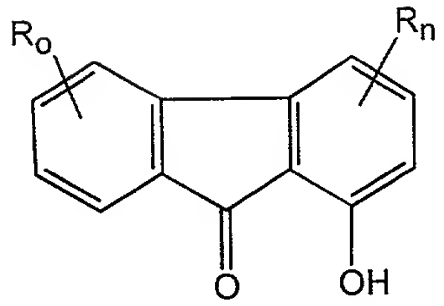

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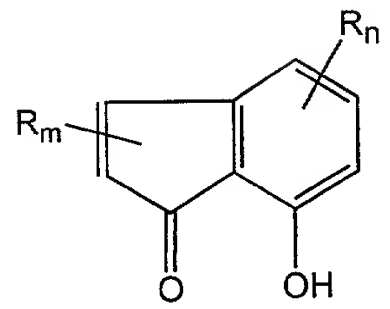

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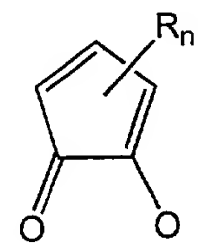

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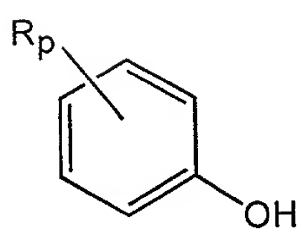

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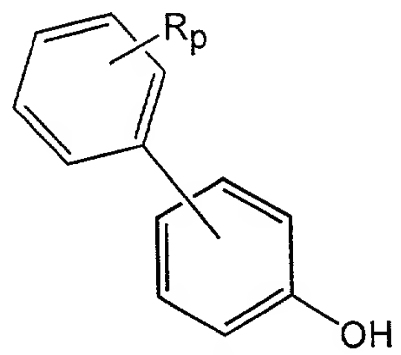

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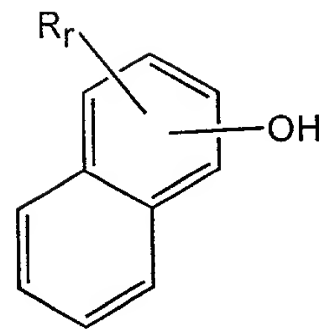

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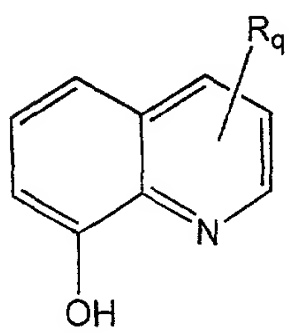

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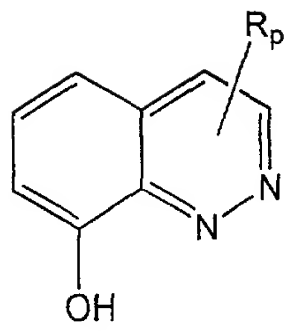

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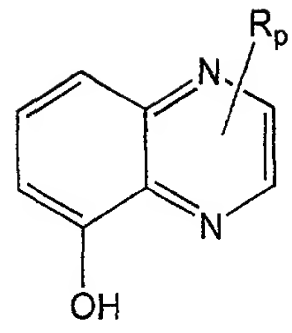

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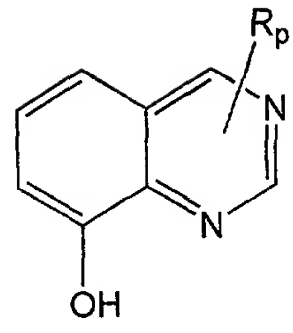

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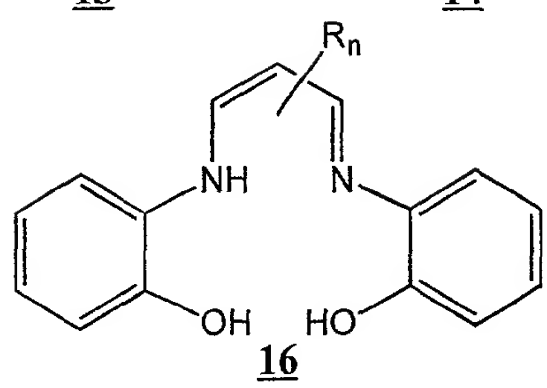

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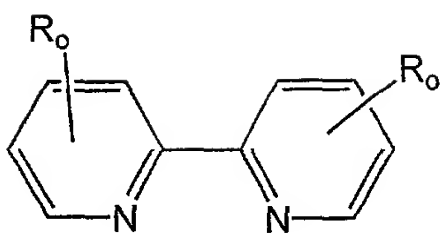

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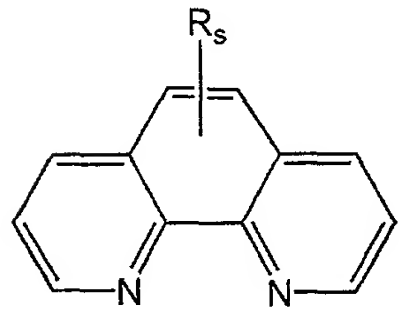

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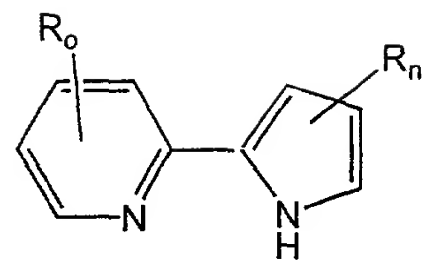

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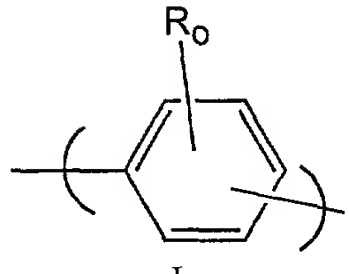
142. The composition of claim 139, wherein Y is selected from the group consisting of:



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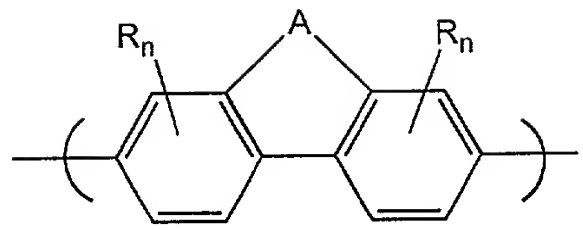

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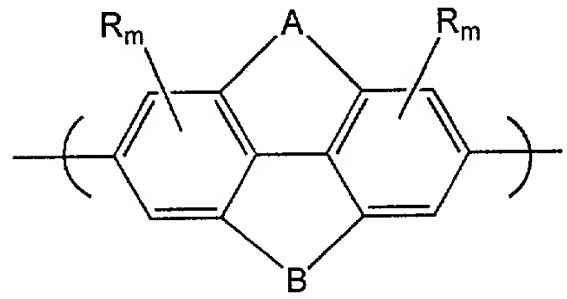

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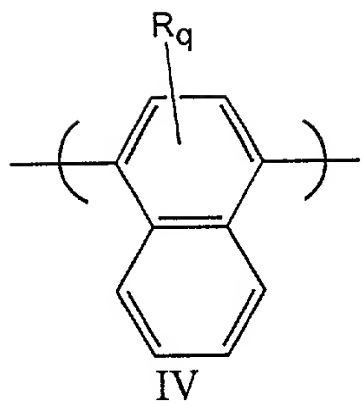

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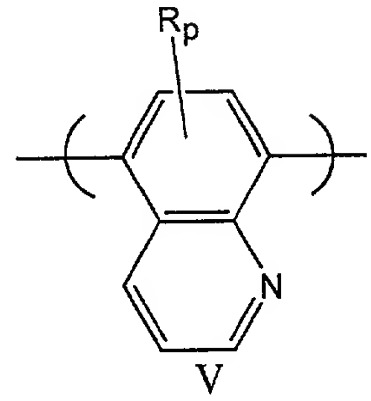

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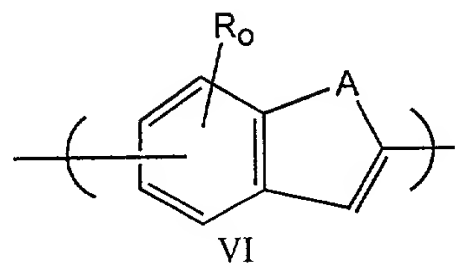

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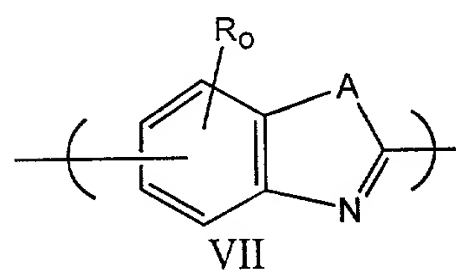

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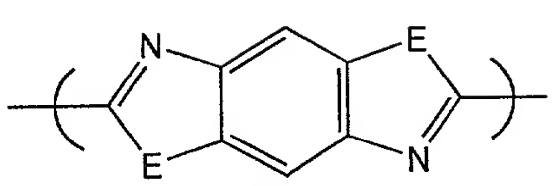

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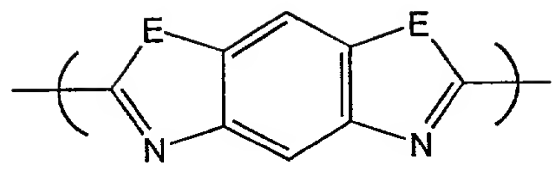

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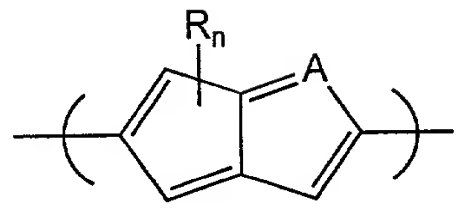

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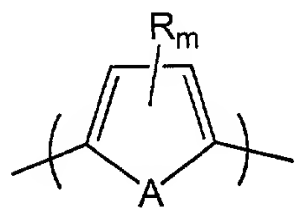

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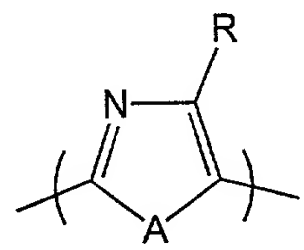
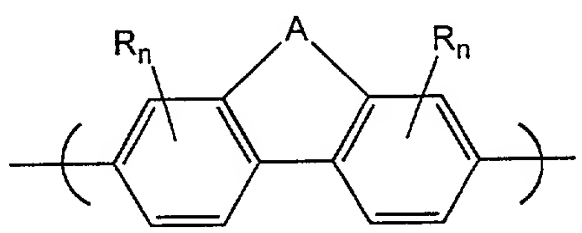


XII

where R on the Y repeat unit(s) is independently selected from H, D, F, Cl, Br, I, alkoxy, aryloxy, alkyl, aryl, alkyl ketone, aryl ketone, alkylester, arylester, amide, carboxylic acid, fluoroalkyl, fluoroaryl, polyalkalene oxy, any two of the Y repeat unit R groups may be bridging, m is 0-2, n is 0-3, o is 0-4, p is 0-5, and q is 0-6, A and B are independently selected from the group consisting of -O-, -S-, -NR_1-, and -CR_1R_2-, -$CR_1R_2CR_3R_4$- , -N=CR_1-, -CR_1=CR_2-, -N=N-, and -(CO)- where R_1-R_4 are H, D, F, Cl, Br, I, alkoxy, aryloxy, alkyl, aryl, alkyleneoxy, polyalkyleneoxy, alkoxy, aryloxy, fluoroalkyl, and fluoroaryl, two of the R groups may be bridging, m is 0-2, n is 0-3, o is 0-4, p is 0-5, q is 0-6, and r is 0-7, and E is selected from the group consisting of O, NH, and S.

143. A composition comprising a polymer comprising repeat units selected from the group consisting of:



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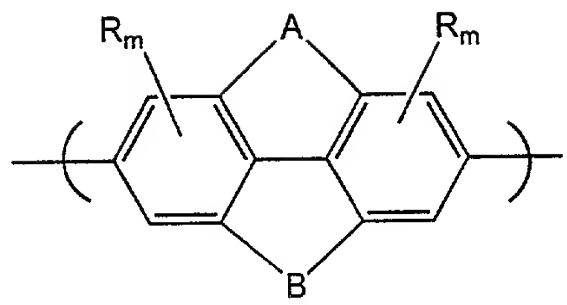

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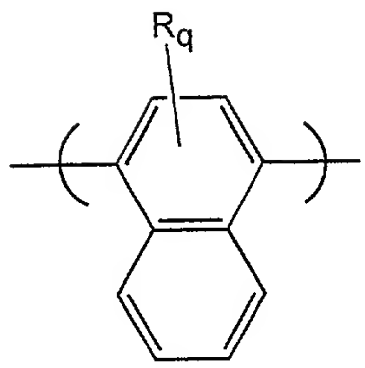
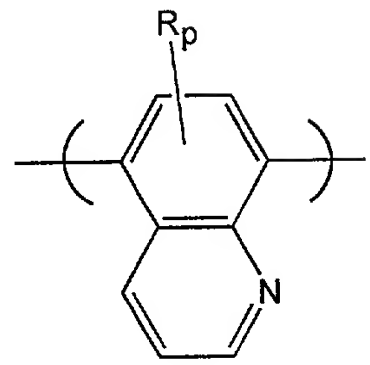


IV



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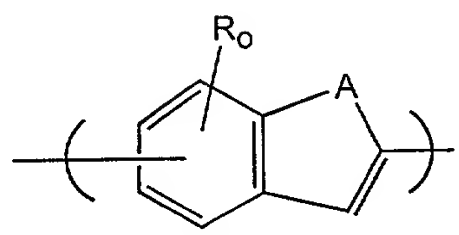

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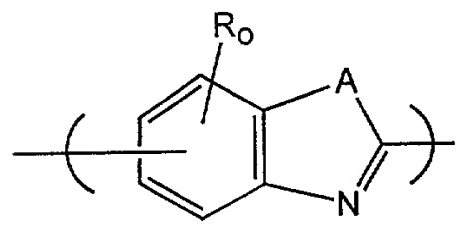
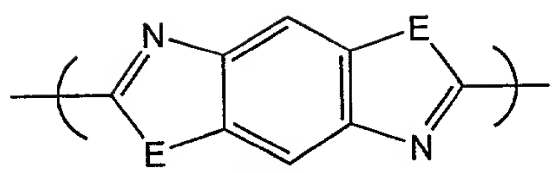
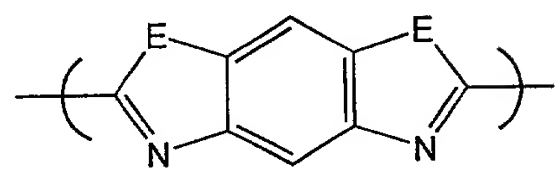


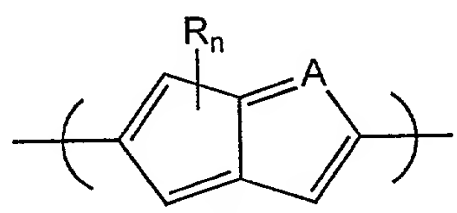
VII



VIII



IX



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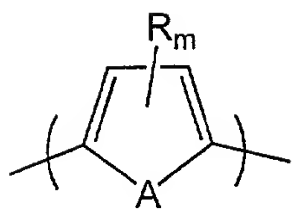
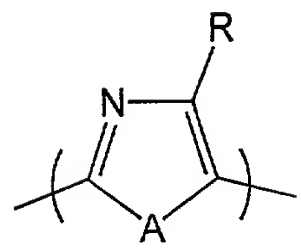


XI



XII

where R is independently selected from H, D, F, Cl, Br, I, alkoxy, aryloxy, alkyl, aryl, alkyl ketone, aryl ketone, alkylester, arylester, amide, carboxylic acid, fluoroalkyl, fluoroaryl, polyalkalene oxy, any two of the R groups may be bridging, m is 0-2, n is 0-3, o is 0-4, p is 0-5, and q is 0-6, A and B are independently selected from the group consisting of -O-, -S-, $-NR_1-$, and $-CR_1R_2-$, $-CR_1R_2CR_3R_4-$, $-N=CR_1-$, $-CR_1=CR_2-$, -N=N-, and -(CO)- where R_1-R_4 are H, D, F, alkyl, aryl, alkyleneoxy, polyalkyleneoxy, alkoxy, aryloxy, fluoroalkyl, and fluoroaryl, two of the R groups may be bridging, m is 0-2, n is 0-3, o is 0-4, p is 0-5, q is 0-6, and r is 0-7, and E is selected from the group consisting of O, NH, and S; and

one or more luminescent metal ions or luminescent metal ion complexes.

144. The composition of claim 143, wherein said polymer has a molecular weight greater than about 50,000 Daltons.

145. The composition of claim 143, wherein said polymer has a molecular weight greater than about 60,000 Daltons.

146. The composition of claim 143, wherein said polymer has a molecular weight greater than about 100,000 Daltons.

147. The composition of claim 143, wherein said polymer has a molecular weight greater than about 150,000 Daltons.

148. The composition of claim 143, wherein said polymer has a molecular weight greater than about 200,000 Daltons.

149. The composition of claim143, wherein said polymer has an inherent viscosity of at least 1.8 dL/g.

150. The composition of claim 143, wherein said polymer has an inherent viscosity of at least 4.2 dL/g.